CLAIMS

1. An isolated nucleic acid molecule encoding a *B. anthracis* LuxS polypeptide.

2. The isolated nucleic acid molecule of claim 1 which encodes a polypeptide comprising an amino acid sequence that is a least 90% identical to the amino acid sequence set forth in SEQ ID NO: 2.

3. The isolated nucleic acid molecule of claim 2 which encodes a polypeptide comprising the amino acid sequence set forth in SEQ ID NO: 2.

4. The isolated nucleic acid molecule which encodes a polypeptide consisting of the amino acid sequence set forth in SEQ ID NO: 2.

5. The isolated nucleic acid molecule of claim 1 wherein the nucleic acid molecule comprises a nucleotide sequence that is at least 80% identical to the nucleotide sequence set forth in SEQ ID NO: 1.

6. The isolated nucleic acid molecule of claim 4 wherein the nucleic acid molecule comprises the nucleotide sequence set forth in SEQ ID NO: 1.

7. The isolated nucleic acid molecule of claim 4 wherein the nucleic acid molecule is the nucleotide sequence set forth in SEQ ID NO: 1.

8. An expression vector comprising the nucleic acid molecule of claim 1, 2, 3, 4, 5, 6 or 7 operatively associated with an expression control sequence.

9. A host cell comprising the expression vector of claim 8.

10. The host cell of claim 9, wherein the host cell is an *E. coli* cell.

11. An isolated *B. anthracis* LuxS polypeptide.

12. The isolated polypeptide of claim 11, comprising an amino acid sequence that is a least 90% identical to the amino acid sequence set forth in SEQ ID NO: 2.

13. The isolated peptide of claim 12, comprising the amino acid sequence set forth in SEQ ID NO: 2.

14. The isolated peptide of claim 12, consisting of the amino acid sequence set forth in SEQ ID NO: 2.

15. An isolated antibody that specifically binds to the polypeptide of claim 11, 12, 13, or 14.

16. The antibody of claim 15 which is a monoclonal antibody.

17. A *B. anthracis* cell in which the *luxS* gene of said *B. anthracis* cell is mutated.

18. The *B. anthracis* cell of claim 17, wherein the *luxS* gene of said *B. anthracis* cell is mutated by removal of the nucleotide sequence set forth in SEQ ID NO: 1 from the genome of said *B. anthracis* cell.

19. *B. anthracis* cell of claim 18, wherein the removed nucleotide sequence is replaced by a nucleotide sequence conferring antibiotic resistance.

20. *B. anthracis* cell of claim 19, wherein the nucleotide sequence conferring antibiotic resistance is a *B. subtilis aphA* gene.

21. A method for preventing or inhibiting the growth of a *B. anthracis* cell, which comprises inhibiting the activity of a *B. anthracis* LuxS polypeptide of said *B. anthracis* cell.

22. The method of claim 21, which comprises inhibiting said LuxS polypeptide by mutating the *luxS* gene of said *B. anthracis* cell.

23. The method of claim 22, which comprises mutating the *luxS* gene of said *B. anthracis* cell by removal of the nucleotide sequence set forth in SEQ ID NO: 1 from the genome of said *B. anthracis* cell.

24. The method of claim 23, wherein the removed nucleotide sequence is replaced by a nucleotide sequence conferring antibiotic resistance.

25. The method of claim 24, wherein the nucleotide sequence conferring antibiotic resistance is a *B. subtilis aphA* gene.

26. A pharmaceutical composition comprising an inhibitor of a *B. anthracis* LuxS polypeptide and a pharmaceutically acceptable carrier.

27. A method for the prevention of *B. anthracis* infection in a subject in need of such prevention, which method comprises administering to the subject a vaccine comprising *B. anthracis* cells containing a mutated *luxS* gene.

28. The method of claim 27, wherein the subject comprises a human.

29. The method of claim 28, wherein the *luxS* gene of said *B. anthracis* cell is mutated by removal of the nucleotide sequence set forth in SEQ ID NO: 1 from the genome of said *B. anthracis* cell.

30. The method of claim 29, wherein the removed nucleotide sequence is replaced by a nucleotide sequence conferring antibiotic resistance.

31. The method of claim 30, wherein the nucleotide sequence conferring antibiotic resistance is a *B. subtilis aphA* gene.

32. A method for enhancing an immune response to *B. anthracis* infection in a subject in need of such enhancement, which method comprises administering a vaccine comprising *B. anthracis* cells containing a mutated *luxS* gene.

33. The method of claim 32, wherein the subject comprises a human.

34. The method of claim 32, wherein the *luxS* gene of said *B. anthracis* cell is mutated by removal of the nucleotide sequence set forth in SEQ ID NO: 1 from the genome of said *B. anthracis* cell.

35. The method of claim 34, wherein the removed nucleotide sequence is replaced by a nucleotide sequence conferring antibiotic resistance.

36. The method of claim 35, wherein the nucleotide sequence conferring antibiotic resistance is a *B. subtilis aphA* gene.

37. A vaccine comprising a *B. anthracis* cell in which the *luxS* gene of said *B. anthracis* cell is mutated and a pharmaceutically acceptable carrier.

38. The vaccine of claim 37 comprising an adjuvant.

39. The vaccine of claim 37, wherein the *luxS* gene of said *B. anthracis* cell is mutated by removal of the nucleotide sequence set forth in SEQ ID NO: 1 from the genome of said *B. anthracis* cell.

40. The vaccine of claim 39, wherein the removed nucleotide sequence is replaced by a nucleotide sequence conferring antibiotic resistance.

41. The vaccine of claim 40, wherein the nucleotide sequence conferring antibiotic resistance is a *B. subtilis aphA* gene.

42. A method for preventing or inhibiting the growth of a *B. anthracis* cell, which comprises exposing the *B. anthracis* cell to an effective amount of a furanone selected from the group consisting of (5Z)-4-bromo-5-(bromomethylene)-3-butyl-2(5H)-furanone, 3-butyl-5-(dibromomethylene)-2-(5H)-furanone, 5-(bromomethylene)-2-(5H)-furanone, 4-bromo-5-(bromomethylene)-2(5H)-furanone, and 5-(dibromomethylene)-2(5H)-furanone for inhibition or preventing the growth of said *B. anthracis* cell.

43. The method of claim 42, wherein the furanone is (5Z)-4-bromo-5-(bromomethylene)-3-butyl-2(5H)-furanone.

44. The method of claim 42, wherein the furanone is inhibiting the activity of an AI-2 quorum-sensing molecule of said *B. anthracis* cell.

45. A method for the treatment or prevention of *B. anthracis* infection in a subject in need of such prevention or treatment, which comprises administering to the subject a therapeutically effective amount of a furanone selected from the group consisting of (5Z)-4-bromo-5-(bromomethylene)-3-butyl-2(5H)-furanone, 3-butyl-5-(dibromomethylene)-2-(5H)-furanone, 5-(bromomethylene)-2-(5H)-furanone, 4-bromo-5-(bromomethylene)-2(5H)-furanone, and 5-(dibromomethylene)-2(5H)-furanone.

46. The method of claim 45, wherein the subject is a human.

47. The method of claim 45, wherein the furanone is (5Z)-4-bromo-5-(bromomethylene)-3-butyl-2(5H)-furanone.

48. The method of claim 45, wherein the furanone is inhibiting the *B. anthracis* AI-2 quorum-sensing molecule.

49. A pharmaceutical composition comprising an inhibitor of a *B. anthracis* AI-2 quorum-sensing molecule and a pharmaceutically acceptable carrier.

50. The pharmaceutical composition of claim 49, wherein the inhibitor of the *B. anthracis* AI-2 quorum-sensing molecule is a furanone selected from the group consisting of (5Z)-4-bromo-5-(bromomethylene)-3-butyl-2(5H)-furanone, 3-butyl-5-(dibromomethylene)-2-(5H)-furanone, 5-(bromomethylene)-2-(5H)-furanone, 4-bromo-5-(bromomethylene)-2(5H)-furanone, and 5-(dibromomethylene)-2(5H)-furanone.

51. The pharmaceutical composition of claim 49, wherein the furanone is (5Z)-4-bromo-5-(bromomethylene)-3-butyl-2(5H)-furanone.

52. A method for the treatment or prevention of *B. anthracis* infection in a subject in need of such prevention or treatment, which method comprises administering a therapeutically effective amount of an inhibitor of the *B. anthracis* protective antigen.

53. The method of claim 52, wherein the inhibition comprises inhibiting protective antigen gene expression.

54. The method of claim 52, wherein the inhibition comprises inhibiting protective antigen protein expression or activity.

55. The method of claim 52, wherein the inhibitor of the *B. anthracis* AI-2 quorum-sensing molecule is a furanone selected from the group consisting of (5Z)-4-bromo-5-(bromomethylene)-3-butyl-2(5H)-furanone, 3-butyl-5-(dibromomethylene)-2-(5H)-furanone, 5-(bromomethylene)-2-(5H)-furanone, 4-bromo-5-(bromomethylene)-2(5H)-furanone, and 5-(dibromomethylene)-2(5H)-furanone.

56. The method of claim 55, wherein the furanone is (5Z)-4-bromo-5-(bromomethylene)-3-butyl-2(5H)-furanone.

57. A pharmaceutical composition comprising an inhibitor of *B. anthracis* protective antigen and a pharmaceutically acceptable carrier.

58. The composition of claim 57, wherein the inhibitor acts upon protective antigen gene expression.

59. The composition of claim 57, wherein the inhibitor acts upon protein expression or activity.

60. The pharmaceutical composition of claim 57, wherein the inhibitor of the *B. anthracis* protective antigen is a furanone selected from the group consisting of (5Z)-4-bromo-5-(bromomethylene)-3-butyl-2(5H)-furanone, 3-butyl-5-(dibromomethylene)-2-(5H)-furanone, 5-(bromomethylene-2-(5H)-furanone, 4-bromo-5-(bromomethylene)-2(5H)-furanone, and 5-(dibromomethylene)-2(5H)-furanone.

61. The pharmaceutical composition of claim 57, wherein the furanone is (5Z)-4-bromo-5-(bromomethylene)-3-butyl-2(5H)-furanone.

62. A pharmaceutical composition comprising an inhibitor of *B. anthracis* growth comprising a pharmaceutically acceptable carrier.

63. The pharmaceutical composition of claim 62, wherein the inhibitor of *B. anthracis* growth is a furanone selected from the group consisting of (5Z)- 4-bromo-5-(bromomethylene)-3-butyl-2(5H)-

furanone, 3-butyl-5-(dibromomethylene)-2-(5H)-furanone, 5-(bromomethylene-2-(5H)-furanone, 4-bromo-5-(bromomethylene)-2(5H)-furanone, and 5-(dibromomethylene)-2(5H)-furanone.

64. The pharmaceutical composition of claim 62, wherein the furanone is (5Z)_4-bromo-5-(bromomethylene)-3-butyl-2(5H)-furanone.

65. A method of treating a *B. anthracis* infection in a human in need of such treatment which comprises administering an effective amount of the composition of claim 63 for treating such infection to said human.

66. The method of claim 65, wherein the composition is administered in a range from about 10 to 50 mg/kg.

67. The method of claim 27, wherein the vaccine is administered in a range from about 1×10^6 to about 1×10^{10} cells.

68. The method of claim 27, wherein the vaccine is administered in a range from about 1×10^7 to about 1×10^9 cells.

69. The vaccine of claim 38, wherein the adjuvant is aluminum hydroxide.